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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
PAK, YONG D	

ART UNIT	PAPER NUMBER
1652	

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/910,033	BOMMANUS ET AL.	
	Examiner	Art Unit	
	Yong D Pak	1652	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *August 5, 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,6,8-12,17,19-25,30,32-35 and 40* is/are pending in the application.

4a) Of the above claim(s) *8-12,17,19-25,30,32-35 and 40* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

The amendment filed on August 5, 2003, amending claims 1, 12, 19, and 32 and canceling claims 2-5, 7, 13-16, 18, 26-29, 31, 36-39 and 41, has been entered.

Claims 1, 6, 8-12, 17, 19-25, 30, 32-35 and 40 are pending.

Election/Restrictions

Claims 8-12, 17, 19-25, 30, 32-35 and 40 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 12.

Notice of Possible Rejoinder: The Examiner notes that if claims 1-2 are found directed to an allowable product, then claims 12 and 17, which are directed to the process of making the patentable product, respectively, previously withdrawn from consideration as a result of a restriction requirement, would now be rejoined pursuant to the procedures set forth in the Official Gazette notice dated March 26, 1996 (1184 O.G. 86; see also MPEP 821.04, *In re Ochiai,* and *In re Brouwer*). Since process claims 12 and 17 would be rejoined and fully examined for patentability under 37 CFR 1.104, applicants are instructed to amend said claims as deemed necessary according to rejections made against the elected claims.

Rejections and/or objections not reiterated from previous Office action are hereby withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hummel et al.

The mutant *Lactobacillus brevis* dehydrogenase of SEQ ID NO:2 of the instant invention differs from the wildtype dehydrogenase by one residue, an Aspartic acid at position 38 instead of a Glycine. Position 37 of the dehydrogenase of Hummel et al. is corresponds to position 38 of SEQ ID NO:2 because Hummel et al. is not including the initial Met residue. Therefore, position "38" will be used to refer to both positions of Hummel et al. and the instant invention.

Hummel et al. (WO 99/47684 – form PTO-1449) teach a mutant dehydrogenase comprising of a glycine at position 10, **aspartic acid at position 38**, a leucine at position 39 and a methionine residue at position 49. Hummel et al. teach that the mutant dehydrogenase has a greater affinity towards NAD(H) (pages 2-6 and 28-29).

Hummel et al. teach that the disadvantage of the use of an L. kefir or L. brevis alcohol dehydrogenase is that the enzymes require the co-enzyme NADP(H) and this co-enzyme is substantially less stable and more expensive than NAD(H) (page 1). Hummel et al. teach that decreasing the alkalinity of the dehydrogenase in the co-enzyme docking area can increase the enzyme's preference for NAD(H) rather than for NADP(H) (abstract).

Hummel et al. teach that the basicity of amino acids in the coenzyme docking area can be reduced by displacement of **neutral** or positively charged amino acids with **negatively charged amino acids** (abstract and page 2, 2nd paragraph). Therefore, the disclosure of Hummel et al. is not solely drawn to modifying alcohol dehydrogenases by altering only basic amino acids, but also altering neutral amino acids with acidic amino acids or negatively charged amino acids to lower the basicity of the amino acids in the coenzyme docking area. This coenzyme docking area is specifically taught in the disclosure, page 2.

Hummel et al. does not teach a mutant an alcohol dehydrogenase consisting of an aspartic acid at position 38 of a L. brevis or L. kefir alcohol dehydrogenase.

However, it would have been obvious to one having ordinary skill in the art to apply the teachings of Hummel et al. and make mutants consisting of only one mutation selected from A10G, G38D, R39L or K49M. Hummel et al. teach that the binding location for the co-enzyme is in the area around position 38 and/or 39 (pages 28-29).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to make a mutant *L. kefir or L. brevis* alcohol

dehydrogenase having an aspartic residue at position corresponding to 38. he motivation of making such a mutant is to decrease the alkalinity of the enzyme to increase its affinity towards NAD(H). One of ordinary skill in the art would also have been motivated to make such a mutant to determine whether the increase affinity towards NAD(H) of the mutant of Hummel et al. is due to the synergistic effects of the four mutations or if one mutation is capable of increasing the enzyme's affinity towards NAD(H). One of ordinary skill in the art would have had a reasonable expectation of success since residue 38 lies in the co-enzyme docking area.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, without the recitation of the SEQ ID NO the alcohol dehydrogenase, it is unclear which amino acid residue corresponds to 38. . To overcome this rejection, the claim can be amended as "amino acid change at amino acid position 38 of SEQ ID NO:2.

Response to Arguments

Applicant's arguments filed on August 5, 2003 have been fully considered but they are not persuasive.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 remains rejected under 35 U.S.C. 102(b) as being anticipated by Hummel et al. (WO 99/47684 – form 1449)

Claim 1 is drawn to a mutant *Lactobacillus brevis* dehydrogenase having a mutation at position 38, wherein the mutant has an increased affinity towards NAD(H) than its wildtype. Claim 1 is not limited to a L. brevis or L. kefir dehydrogenase having only one mutation.

Hummel et al. (WO 99/47684) teach a mutant alcohol dehydrogenase from *L. brevis* wherein a Glycine, which corresponds to the residue 38 at position of SEQ ID NO:2 of the instant invention, has been mutated to an Aspartic acid (pages 2-6 and claims 1-12). Hummel et al. teach that the mutant dehydrogenase has greater affinity towards NAD(H) (pages 2-6). Therefore, the teachings of Hummel et al. anticipate claim 1.

Claim 1 remains rejected under 35 U.S.C. 102(e) as being anticipated by Hummel et al.

Claim 1 is drawn to a mutant *Lactobacillus brevis* dehydrogenase having a mutation at position 38, wherein the mutant has an increased affinity towards NAD(H) than its wildtype. Claim 1 is not limited to a L. brevis or L. kefir dehydrogenase having only one mutation.

Hummel et al. (U.S. Patent No. 6,413,750) teach a mutant alcohol dehydrogenase from *L. brevis* wherein a Glycine, which corresponds to the residue 38 at position of SEQ ID NO:2 of the instant invention, has been mutated to an Aspartic acid (Columsn 1-2 and 17-18). Hummel et al. teach that the mutant dehydrogenase has greater affinity towards NAD(H) (Column 18). Therefore, the teachings of Hummel et al. anticipate claim 1.

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yong Pak whose telephone number is 703-308-9363. The examiner can normally be reached on 8:00 A.M. to 4:30 P.M weekdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ponnathapu Achutamurthy can be reached on 703-308-3804. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9307 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0196.

Yong Pak
Patent Examiner

October 16, 2003

PONNATHAPU ACHUTAMURTHY
SUPERVISORY PATENT EXAMINER
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